

# Smoking habits and the risk of type 2 diabetes mellitus in women

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## Objectives

Diabetes mellitus is one of the biggest public health concerns. The emerging pandemic number of patients with type 2 diabetes is driven by the combined effects of population ageing, rising levels of obesity and inactivity [1]. Type 2 diabetes appears to involve interaction between susceptible genetic backgrounds and environmental factors [2]. Smoking exacts a devastating damage on public health. Tobacco use is the most important cause of preventable morbidity and mortality around the world [3]. It's important to identify modifiable risk factors for type 2 diabetes, which may help reduce the risk of the disease. The aim of the study was to assess the relationship between smoking and the risk of type 2 diabetes in women.

## Methods

In case-control study were included 168 cases aged 35-85 years with a newly confirmed diagnosis of type 2 diabetes mellitus during the one whole year and 336 controls which were free of the disease. They were individually matched to the cases by age ( $\pm 5$  years). Ratio of cases and controls was 1:2. A specifically designed questionnaire was used to collect information on possible risk factors of type 2 diabetes. Smoking was assessed according to: smoking habits, duration of smoking, number of cigarettes smoked per day, pack years, smoking cessation. Anthropometrical measurements were made according to the guidelines of WHO. A conditional logistic regression was used to calculate odds ratio (OR) and corresponding 95% confidence interval (CI) for diabetes mellitus in relation to exposures of interest. Variables (such as family history on diabetes, body mass index (BMI), waist circumference (WC), education, plasma triglycerides (TG), morning exercise, eating speed, occupational and marital statuses) were retained in models as confounders when their inclusion changed the value of the OR by more than 5% in any exposure category. All the calculations were performed with the standard STATA 7 software program.

## Results

The cases had higher BMI and significantly lower education level, compared to the controls (Table 1). After adjustment for possible confounders increased risk of type 2 diabetes was determined for those, whose smoked 10 and more cigarettes per day (OR=2.83; 95% CI 1.04-7.71 vs. non-smokers). It has also been defined an association between the disease and duration of smoking (OR=4.55; 95% CI 1.11-18.61 for 40 years or more smokers vs. non-smokers) and those, whose smoking cessation is 19 years and less had higher risk for diabetes (OR=6.40; 95% CI 1.50-27.34 vs. non-smokers) (Table 2).

Table 1. Characteristics of cases and controls.

Variable	Category	Cases		Controls		p value
		n	%	n	%	
Age (years)	$\leq 44$	77	4.17	14	4.17	matched
	45-54	16	9.52	32	9.52	
	55-64	66	39.29	130	38.69	
	$\geq 65$	79	47.02	160	47.62	
Education (years of education)	$\leq 10$	90	53.57	120	35.71	<0.0001
	11-13	46	27.38	142	42.26	
	$\geq 14$	32	19.05	74	22.02	
Marital status	Married	84	50.00	177	52.68	NS
	Divorced/separated	15	8.93	37	11.01	
	Single	9	5.36	24	7.14	
	Widowed	60	35.71	98	29.17	
BMI	$\leq 24.9$	12	7.14	84	25.00	<0.0001
	25-29.9	40	23.81	116	34.52	
	$\geq 30.0$	116	69.05	136	40.48	
Family history of diabetes	No	118	70.24	297	88.39	<0.0001
	Yes	50	29.76	39	11.61	

NS – not significant.

Table 2. Odds ratios and 95% CI confidence intervals for type 2 diabetes mellitus in relation to smoking

Variable	Category	Cases		Controls		OR* (95% CI) p for trend	OR** (95% CI) p for trend
		N	%	N	%		
Smoking	Non-smoker	137	81.55	300	89.29	1.00	1.00
	Ex-smoker	16	9.52	18	5.36	1.68 (0.79-3.60)	1.41 (0.84-4.33)
	Sometimes	4	2.38	6	1.78	1.50 (0.34-6.64)	1.14 (0.23-5.59)
	Current smoker	11	6.55	12	3.57	1.80 (0.62-5.22)	1.63 (0.54-4.94)
						p=0.281	p=0.384
Duration of smoking (years)	Non-smoker	137	81.55	300	89.29	1.00	1.00
	$\leq 19$	7	4.16	17	5.06	0.71 (0.26-1.94)	0.92 (0.32-2.60)
	20-39	11	6.55	15	4.46	1.72 (0.67-4.46)	1.63 (0.59-4.48)
	$\geq 40$	13	7.74	4	1.19	5.70 (1.50-21.69)	4.55 (1.11-18.61)
						p=0.011	p=0.035
Number cigarettes smoked per day	Non-smoker	137	81.55	300	89.29	1.00	1.00
	$\leq 9$	13	7.74	25	7.44	1.94 (0.56-2.54)	1.25 (0.57-2.77)
	$\geq 10$	18	10.71	11	3.27	2.93 (1.16-7.40)	2.83 (1.04-7.71)
							p=0.023
Pack-years	Non-smoker	137	81.55	300	89.29	1.00	1.00
	$\leq 9$	18	10.71	31	9.22	1.19 (0.60-2.40)	1.38 (0.66-2.88)
	$\geq 10$	13	7.74	5	1.49	4.83 (1.42-16.47)	3.29 (0.87-12.42)
							p=0.012
Smoking cessation (years)	Non-smoker	137	81.55	300	94.34	1.00	1.00
	$\leq 19$	10	6.54	4	1.26	6.60 (1.67-26.05)	6.40 (1.50-27.34)
	$\geq 20$	6	3.92	4.40	11.96	0.94 (0.32-2.77)	1.18 (0.39-3.59)
						p=0.007	p=0.012

OR\* adjusted for family history on diabetes and BMI; OR\*\* family history on diabetes, BMI, waist circumference, education, plasma TG, morning exercise, eating speed, occupational and marital statuses.

## Conclusions

Our data support a possible relationship between smoking and the increased risk of type 2 diabetes in women.

## References:

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